CLAIMS

1. A method for performing mass spectrometry of sulfur atom-containing derivatives of an organic residue, characterized in that the method comprises ionizing a metal-organic residue complex into the derivatives, wherein the complex has the organic residue bound through a sulfur atom to the metal.

2. A method for performing mass spectrometry of a compound or salt thereof, characterized in that the method comprises ionizing a metal-organic residue complex into sulfur atom-containing derivatives,
wherein the metal-organic residue complex is represented by the general formula (I)

$(R\text{-}S)_n\text{-}M^1$ (I),

wherein R is an organic residue, S is a sulfur atom and n indicates a stoichiometric ratio of (R-S) group with respect to M^1 and is an integer equal to or greater than 1; and

wherein the compound is represented by the general formulae (II) and/or (III):

R-SH (II) and/or

R-S-S-R (III),

wherein R and S are the same as defined above.

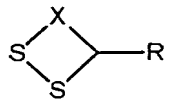
3. A method for performing mass spectrometry of a compound or salt thereof, characterized in that the method comprises ionizing a metal-organic residue complex into sulfur atom-containing derivatives,
wherein the metal-organic residue complex is represented by the general formula (IV):

$M^1\text{-}S\text{-}X\text{-}CH(R)\text{-}S\text{-}M^1$ (IV),

wherein R is an organic residue, S is a sulfur atom, M^1 at both ends are same metal entities, X is a lower alkylene or a lower alkenylene;

wherein the compound is represented by the general formulae (V) and/or (VI):

HS-X-CH(R)-SH (V) and/or



(VI)

wherein R, S and X are the same as defined above.

4. A method for performing mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising the following steps of:

1) contacting a metal-organic residue complex with a sugar chain or a sugar chain-containing substance under the conditions where the metal-organic residue complex and the sugar chain or sugar chain-containing substance may react with each other, wherein the metal-organic residue complex contains a metal bound to a group represented by the following formula:

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH_2$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH(CH_3)$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH(NH_2)-W^4-SH$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=S)-CH(NH_2)-W^4-SH$,

$-S-W^1-O-NH_2$,

$-S-W^1-O-NH(CH_3)$,

$-S-W^1-O-W^2-O-NH_2$,

$-S-W^1-O-W^2-O-NH(CH_3)$,

$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH_2$,

$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH(CH_3)$,

$-S-W^1-C(=O)-NH-NH_2$,

$-S-W^1-C(=S)-NH-NH_2$,

$-S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH$,

$-S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH$

$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2$,

$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3)$,

$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,

$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH$,

$-S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH$,

$-S-Z^1-O-Z^3-O-NH_2$,

$-S-Z^1-O-Z^3-O-NH(CH_3)$,

$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2$,

$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3)$,

$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$

$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH$

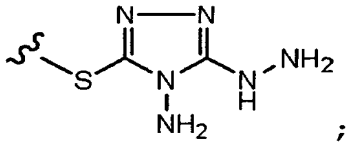
$-S-Z^1-Z^3-Z^4-Z^5-O-NH_2$,

$-S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3)$,

$-S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,

$-S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH$,

or



;

2) obtaining the metal-organic residue complex bound to the sugar chain or the sugar chain-containing substance; and 3) ionizing the metal-organic residue complex bound to the sugar chain or the sugar chain-containing substance into sulfur atom-containing derivatives of the organic residue.

5. A method according to any one of claims 1 to 4, wherein the metal has a surface enough to cause a diffuse reflection of a laser beam.

6. A method according to claim 5, wherein the metal is a fine metal particle.

7. A method according to any one of claims 1 to 6, wherein the metal is gold, silver, cadmium or selenium.

8. A method according to any one of claims 1 to 6, wherein the mass spectrometry is carried out by MALDI-TOF MS method.

9. A method according to any one of claims 1 to 3, wherein the organic residue is a group comprising a sugar chain or a sugar chain-containing substance.

10. A method for performing mass spectrometry of a sulfur atom-containing analyte comprising the steps of:

1) reacting tetrachloroauric acid with a sulfur atom-containing analyte in the presence of a reducing agent;

2) obtaining a gold-analyte complex particle which has the analyte bound through the sulfur atom to the gold; and

3) ionizing the obtained gold-analyte complex particles into a sulfur atom-containing analyte derivative.

11. A metal-organic residue complex containing a metal bound to a group represented by the following formula:

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH_2$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH(CH_3)$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH(NH_2)-W^4-SH$,

$-S-Y-(OCH_2CH_2)_n-NH-C(=S)-CH(NH_2)-W^4-SH$,

$-S-W^1-O-NH_2$,

$-S-W^1-O-NH(CH_3)$,

$-S-W^1-O-W^2-O-NH_2$,

$-S-W^1-O-W^2-O-NH(CH_3)$,

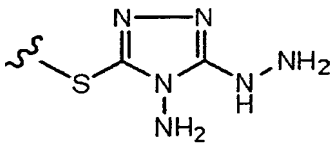
$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH_2$,

$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH(CH_3)$,

$-S-W^1-C(=O)-NH-NH_2$,

$-S-W^1-C(=S)-NH-NH_2$,
$-S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH$,
$-S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH$,
$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3)$,
$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,
$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH$,
$-S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH$,
$-S-Z^1-O-Z^3-O-NH_2$,
$-S-Z^1-O-Z^3-O-NH(CH_3)$,
$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3)$,
$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$
$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH$
$-S-Z^1-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3)$,
$-S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,
$-S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH$,

or



wherein, Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

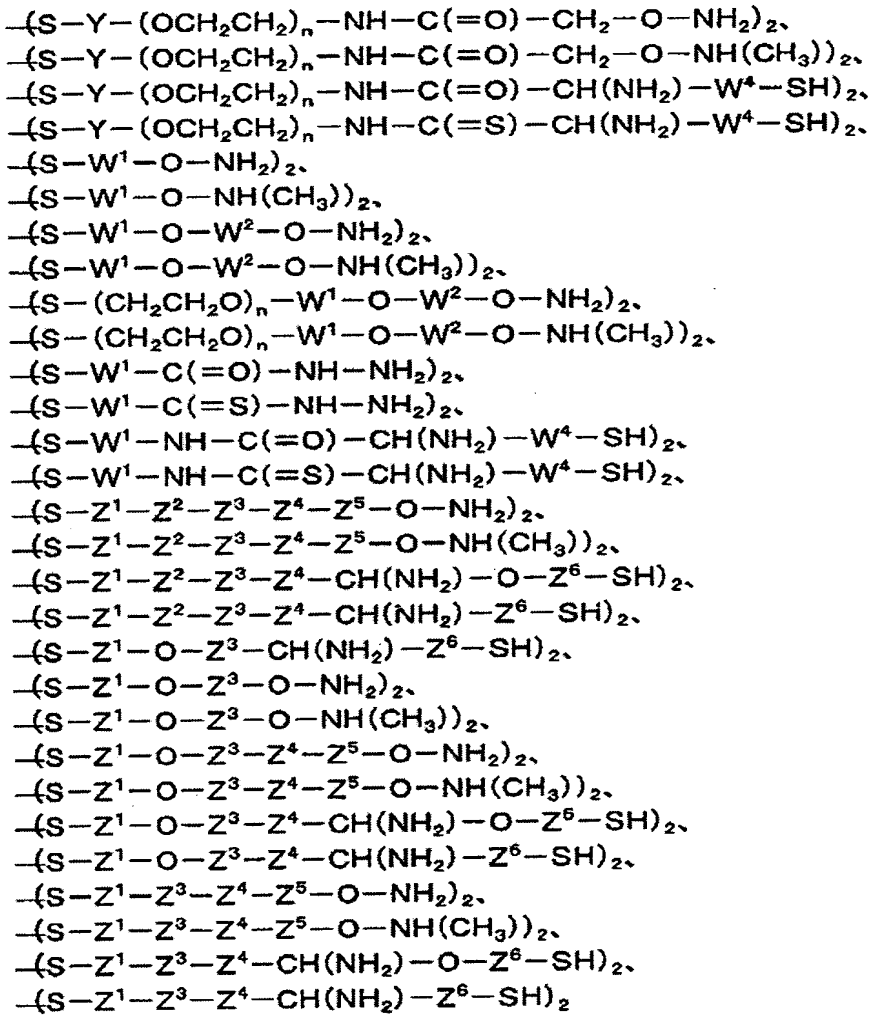
Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene; and

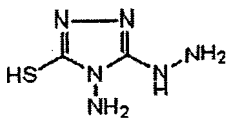
n is an integer between 1 and 10, inclusive.

12. A method for producing metal-organic residue complex

particles, wherein the method comprises reacting tetrachloroauric acid with a compound represented by the following formula:



or



,or a salt thereof, in the presence of a reducing agent, wherein, Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

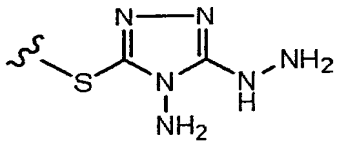
W^4 is C1-C2 alkylene;
Z^1 is substituted or unsubstituted arylen or heteroarylen;
Z^2 is a nitrogen-containing heterocycle;
Z^3 and Z^5 are independently C1-C12 alkylene;
Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;
Z^6 is C1-C2 alkylene; and
n is an integer between 1 and 10, inclusive.

13. A method for trapping a sugar chain or a sugar chain-containing substance, characterized in that the method comprises contacting a metal-organic residue complex with a sugar chain or a sugar chain-containing substance, under conditions where the metal-organic residue complex and the sugar chain or the sugar chain-containing substance may react with each other,
the metal-organic residue complex has a metal bound to a group represented by the following formula:

$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH_2$,
$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH(CH_3)$,
$-S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH(NH_2)-W^4-SH$,
$-S-Y-(OCH_2CH_2)_n-NH-C(=S)-CH(NH_2)-W^4-SH$,
$-S-W^1-O-NH_2$,
$-S-W^1-O-NH(CH_3)$,
$-S-W^1-O-W^2-O-NH_2$,
$-S-W^1-O-W^2-O-NH(CH_3)$,
$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH_2$,
$-S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH(CH_3)$,
$-S-W^1-C(=O)-NH-NH_2$,
$-S-W^1-C(=S)-NH-NH_2$,
$-S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH$,
$-S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH$,
$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3)$,

$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,
$-S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH$,
$-S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH$,
$-S-Z^1-O-Z^3-O-NH_2$,
$-S-Z^1-O-Z^3-O-NH(CH_3)$,
$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3)$,
$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$
$-S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH$
$-S-Z^1-Z^3-Z^4-Z^5-O-NH_2$,
$-S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3)$,
$-S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH$,
$-S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH$,

or



wherein, Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene; and

n is an integer between 1 and 10, inclusive.

14. A method for measuring the molecular weight of a substance which may interact with an organic residue of a metal-organic residue complex, comprising the steps of:

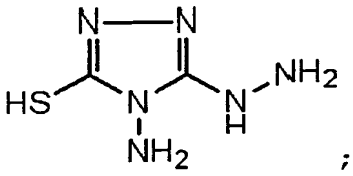
1) contacting the metal-organic residue complex with a substance which may interact with the organic residue, wherein the metal is bound through a sulfur atom to organic residue;

2) obtaining the metal-organic residue complex bound to the substance which may interact; and

3) ionizing the obtained metal-organic residue complex into derivatives of the organic residue, wherein the organic residue contains a sulfur atom.

15. A method for performing mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising the steps of:

1) contacting a compound with a metal, wherein the compound is represented by the following formula:



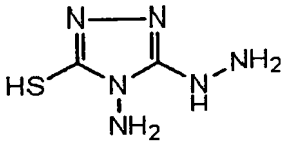
;

2) contacting the metal-organic residue complex obtained in 1) with a sugar chain or a sugar chain-containing substance under conditions where the metal-organic residue complex and the sugar chain or the sugar chain-containing substance may react with each other; and

3) ionizing the metal-organic residue complex obtained in 2) into derivatives of the organic residue, wherein the organic residue contains a sulfur atom.

16. A method for performing mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising the steps of:

1) contacting a compound represented by the following formula:



with a sugar chain or a sugar chain-containing substance under conditions where the compound and the sugar chain or the sugar chain-containing substance may react with each other;

2) contacting the compound obtained in 1) with a metal; and

3) ionizing the metal-organic residue complex obtained in 2) into derivatives of the organic residue, wherein the organic residue contains a sulfur atom.

17. A composition for trapping a sugar chain, comprising :

a compound represented by the general formula (II):

R-SH (II) or a salt thereof, wherein R is an organic residue; and S is a sulfur atom;

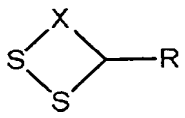
a compound represented by the general formula (III):

R-S-S-R (III) or a salt thereof, wherein, R and S are the same as defined above;

a compound represented by the general formula (V):

HS-X-CH(R)-SH (V) or a salt thereof, wherein R and S are the same as defined above; and X is lower alkylene or lower alkenylene; or

a compound represented by the general formula (VI):



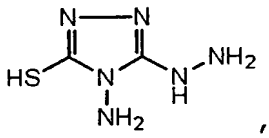
(VI)

or a salt thereof, wherein, R, S and X are the same as defined above; or a mixture thereof.

18. A composition for trapping a sugar chain, comprising a compound represented by the following formula:

$-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH_2)_2$,
$-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH(CH_3))_2$,
$-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH(NH_2)-W^4-SH)_2$,
$-(S-Y-(OCH_2CH_2)_n-NH-C(=S)-CH(NH_2)-W^4-SH)_2$,
$-(S-W^1-O-NH_2)_2$,
$-(S-W^1-O-NH(CH_3))_2$,
$-(S-W^1-O-W^2-O-NH_2)_2$,
$-(S-W^1-O-W^2-O-NH(CH_3))_2$,
$-(S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH_2)_2$,
$-(S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH(CH_3))_2$,
$-(S-W^1-C(=O)-NH-NH_2)_2$,
$-(S-W^1-C(=S)-NH-NH_2)_2$,
$-(S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH)_2$,
$-(S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH)_2$,
$-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2)_2$,
$-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3))_2$,
$-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_2$,
$-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH)_2$,
$-(S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH)_2$,
$-(S-Z^1-O-Z^3-O-NH_2)_2$,
$-(S-Z^1-O-Z^3-O-NH(CH_3))_2$,
$-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2)_2$,
$-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3))_2$,
$-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_2$,
$-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH)_2$,
$-(S-Z^1-Z^3-Z^4-Z^5-O-NH_2)_2$,
$-(S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3))_2$,
$-(S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_2$,
$-(S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH)_2$

or



,

wherein Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene; and

n is an integer between 1 and 10, inclusive.

19. A metal-organic residue complex represented by the following formula:

$M^2-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH_2)_m$,

$M^2-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH_2-O-NH(CH_3))_m$,

$M^2-(S-Y-(OCH_2CH_2)_n-NH-C(=O)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-Y-(OCH_2CH_2)_n-NH-C(=S)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-W^1-O-NH_2)_m$,

$M^2-(S-W^1-O-NH(CH_3))_m$,

$M^2-(S-W^1-O-W^2-O-NH_2)_m$,

$M^2-(S-W^1-O-W^2-O-NH(CH_3))_m$,

$M^2-(S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH_2)_m$,

$M^2-(S-(CH_2CH_2O)_n-W^1-O-W^2-O-NH(CH_3))_m$,

$M^2-(S-W^1-C(=O)-NH-NH_2)_m$,

$M^2-(S-W^1-C(=S)-NH-NH_2)_m$,

$M^2-(S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

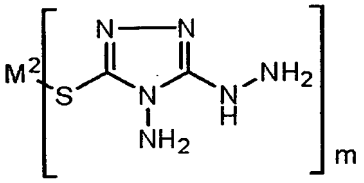
$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

or the general formula (VII):



(VII)

wherein, M^2 is a metal;

m indicates a stoichiometric ratio of an organic residue with respect to M^2 and is an integer equal to or greater than 1, wherein the organic residue contains a sulfur atom;

Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen ;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene; and

n is an integer between 1 and 10, inclusive.

20. A composition for trapping a sugar chain, comprising:

a metal-organic residue complex represented by the general formula (I):

$(R\text{-}S)_n\text{-}M^1$ (I),

wherein R is an organic residue; S is a sulfur atom; M^1 is a metal; and n indicates a stoichiometric ratio of (R-S) group with respect to M^1 and is an integer equal to or greater than 1; or

a metal-organic residue complex represented by the general formula (IV):

$M^1\text{-}S\text{-}X\text{-}CH(R)\text{-}S\text{-}M^1$ (IV),

wherein R and S are the same as defined above, M^1 at both ends are a metal of the same substance and X is lower alkylene or lower alkenylene.

21. A composition for trapping a sugar chain, comprising a metal-organic residue complex, represented by the following formula:

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH_2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH_2\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=S)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}(CH_2CH_2O)_n\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}(CH_2CH_2O)_n\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}W^1\text{-}C(=O)\text{-}NH\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}C(=S)\text{-}NH\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}NH\text{-}C(=O)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}NH\text{-}C(=S)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}Z^1\text{-}Z^2\text{-}Z^3\text{-}Z^4\text{-}Z^5\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}Z^1\text{-}Z^2\text{-}Z^3\text{-}Z^4\text{-}Z^5\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}Z^1\text{-}Z^2\text{-}Z^3\text{-}Z^4\text{-}CH(NH_2)\text{-}O\text{-}Z^6\text{-}SH)_m$,

$M^2\text{-}(S\text{-}Z^1\text{-}Z^2\text{-}Z^3\text{-}Z^4\text{-}CH(NH_2)\text{-}Z^6\text{-}SH)_m$,

$M^2-(S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

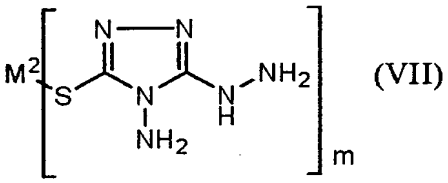
$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

or the general formula (VII):



(VII)

wherein,

M^2 is a metal;

m indicates a stoichiometric ratio of an organic residue with respect to M^2 and is an integer equal to or greater than 1, wherein the organic residue comprises a sulfur atom;

Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene and

n is an integer between 1 and 10, inclusive.

22. A kit for mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising:

A) a compound represented by the general formula (II):

R-SH (II)

or a salt thereof, wherein R is an organic residue; and S is a sulfur atom;

a compound represented by the general formula (III)

R-S-S-R (III)

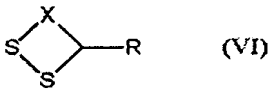
or a salt thereof, wherein R and S are the same as defined above;

a compound represented by the general formula (V):

HS-X-CH(R)-SH (V)

or a salt thereof, wherein R and S are the same as defined above; and X is lower alkylene or lower alkenylene; or

a compound represented by the general formula (VI):



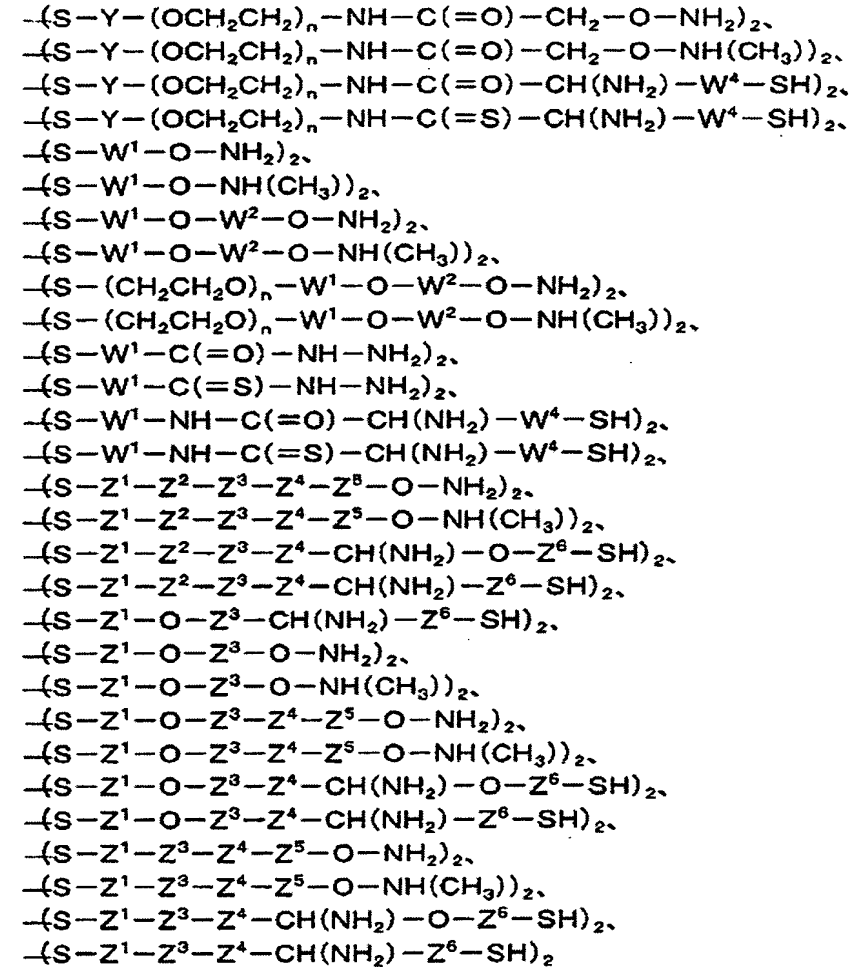
(VI)

or a salt thereof, wherein R, S and X are the same as defined above; or a mixture thereof; and

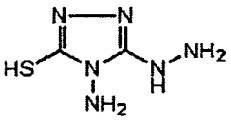
B) a metal.

23. A kit for mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising:

A) a sulfur atom containing derivatives of an organic residue, represented by the following formula:



or



wherein Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene;

W^4 is C1-C2 alkylene;

Z^1 is substituted or unsubstituted arylen or heteroarylen;

Z^2 is a nitrogen-containing heterocycle;

Z^3 and Z^5 are independently C1-C12 alkylene;

Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-;

Z^6 is C1-C2 alkylene; and

n is an integer between 1 and 10, inclusive; and

B) a metal.

24. A kit for mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising:

a metal-organic residue complex represented by the general formula (I):

$(R\text{-}S)_n\text{-}M^1$ (I)

wherein, R is an organic residue, S is a sulfur atom, M^1 is a metal and n indicates a stoichiometric ratio of (R-S) group with respect to M^1 and is an integer equal to or greater than 1; or

a metal-organic residue complex represented by the general formula (IV):

$M^1\text{-}S\text{-}X\text{-}CH(R)\text{-}S\text{-}M^1$ (IV)

wherein R and S are the same as defined above, M^1 at both ends are same metal entities and X is lower alkylene or lower alkenylene.

25. A kit for mass spectrometry of a sugar chain or a sugar chain-containing substance, comprising a metal-organic residue complex, represented by the following formula:

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH_2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH_2\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=O)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}Y\text{-}(OCH_2CH_2)_n\text{-}NH\text{-}C(=S)\text{-}CH(NH_2)\text{-}W^4\text{-}SH)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH(CH_3))_m$,

$M^2\text{-}(S\text{-}(CH_2CH_2O)_n\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH_2)_m$,

$M^2\text{-}(S\text{-}(CH_2CH_2O)_n\text{-}W^1\text{-}O\text{-}W^2\text{-}O\text{-}NH(CH_3))_m$,

$M^2-(S-W^1-C(=O)-NH-NH_2)_m$,

$M^2-(S-W^1-C(=S)-NH-NH_2)_m$,

$M^2-(S-W^1-NH-C(=O)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-W^1-NH-C(=S)-CH(NH_2)-W^4-SH)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-Z^2-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-CH(NH_2)-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-O-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

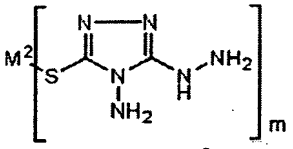
$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH_2)_m$,

$M^2-(S-Z^1-Z^3-Z^4-Z^5-O-NH(CH_3))_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-O-Z^6-SH)_m$,

$M^2-(S-Z^1-Z^3-Z^4-CH(NH_2)-Z^6-SH)_m$,

or the general formula (VII):



(VII)

wherein, M^2 is a metal, m indicates a stoichiometric ratio of an organic residue with respect to M^2 and is an integer equal to or greater than one, the organic residue comprises a sulfur atom, Y, W^1 and W^2 are independently C1-C12 alkylene, C2-C12 alkenylene or C2-C12 alkynylene, W^4 is C1-C2 alkylene; Z^1 is substituted or unsubstituted arylen or heteroarylen; Z^2 is a nitrogen-containing heterocycle, Z^3 and Z^5 are independently C1-C12 alkylene, Z^4 is -O-C(=O), -O-C(=S), -NH-C(=O), -NH-C(=S), -O- or -S-, Z^6 is C1-C2 alkylene; and n is an integer between 1 and 10, inclusive.

26. A method according to any one of claims 1 to 6, wherein the mass spectrometry is carried out by LDI-TOF MS method.

27. A method according to claim 10, wherein the mass spectrometry is carried out by LDI-TOF MS method.